**CLAIMS** 

## What is claimed is:



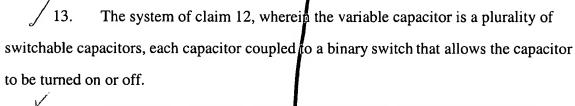
- 1. A device comprising:
  - a voltage-controlled oscillator (VCO) circuit, the VCO circuit including
- a) a variable capacitor for coarsely tuning the VCO circuit, the variable capacitor providing one of a plurality of capacitance values, each of the plurality of capacitance values corresponding to a distinct frequency band, each of the plurality of capacitance values providing a frequency/voltage characteristic for the VCO that is sufficiently linear to implement direct modulation for the frequency band,
  - b) a varactor for fine tuning the VCO circuit,
- c) a series capacitor having a capacitance value to linearize a frequency/voltage characteristic of the varactor sufficient to implement direct modulation for a specified channel frequency within the frequency band.
- 2. The device of claim 1, wherein the variable capacitor is a plurality of switchable capacitors, each capacitor coupled to a binary switch that allows the capacitor to be turned on or off.
- 3. The device of claim 2, wherein the plurality of capacitance values comprises sixteen capacitance values, each capacitance value corresponding to one of sixteen frequency bands.
- 4. The device of claim 3, wherein the sixteen frequency bands cover a frequency range of 2200Mhz to 2700Mhz.
- 5. The device of claim 4, wherein the specified channel frequency is a frequency selected from the group consisting of 2402Mhz + nMhz, where n is an integer from 0 to 78.
- 6. The device of claim 3, wherein the VCO circuit is implemented as an integrated circuit.



7. The device of claim 6, wherein the series capacitor is a metal-insulator-metal type capacitor.

8. The device of claim 1 further comprising: at least one resistor to couple an input voltage to the VCO circuit, the at least one resistor dampening external noise.

- The device of claim 8, wherein the input voltage comprises a reference voltage and a control voltage.
- (10.) The device of claim 9, wherein the reference voltage is used to bias a diode of the varactor to a desired bias point.
- The device of claim 10, wherein the series capacitor isolates the reference voltage.
  - 12. A system comprising:
    - -a phase comparator circuit;
    - /a charge pump;
    - /a loop filter circuit;
      - a fractional-n frequency divider; and
    - a voltage controlled oscillator (VCO) circuit, the VCO circuit including
- a) a variable capacitor for coarsely tuning the VCO circuit, the variable capacitor providing one of a plurality of capacitance values, each of the plurality of capacitance values corresponding to a distinct frequency band, each of the plurality of capacitance values providing a frequency/voltage characteristic for the VCO that is sufficiently linear to implement direct modulation for the frequency band,
  - b) a varactor for fine tuning the VCO circuit,
- c) a series capacitor having a capacitance value to linearize a frequency/voltage characteristic of the varactor sufficient to implement direct modulation for a specified channel frequency within the frequency band.



- 14. The system of claim 13, wherein the plurality of capacitance values comprises sixteen capacitance values, each capacitance value corresponding to one of sixteen frequency bands.
- The system of claim 14, wherein the sixteen frequency bands cover a frequency range of 2200Mhz to 2700Mhz.
- The system of claim 15, wherein the specified channel frequency is a frequency selected from the group consisting of 2402Mhz + nMhz, where n is an integer from 0 to 78.
- 17. The system of claim 14, wherein the VCO circuit is implemented as an integrated circuit.
- 718. The system of claim 17, wherein the series capacitor is a metal-insulator-metal type capacitor.
  - 19. The system of claim 12 further comprising:

at least one resistor to couple an input voltage to the VCO circuit, the at least one resistor dampening external noise.

- 20. The system of claim 19, wherein the input voltage comprises a reference voltage and a control voltage.
- The system of claim 20, wherein the reference voltage is used to bias a diode of the varactor to a desired bias point.
- 22. The system of claim 21, wherein the series capacitor isolates the reference voltage.